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REMARKS

Claims 1-35 are pending in the present Application. Claims 4, 15, 19, 24, and 30 have been cancelled, Claims 1, 12 – 14, 21, 25 – 27, and 33 have been amended, and Claims 36 – 43 have been added, leaving Claims 1 – 3, 5 – 14, 16 – 18, 20 – 23, 25 – 29, and 31 – 43 for consideration upon entry of the present Amendment.

Support for the amendment to Claims 1, 21, 27, and 33 can at least be found in the specification at page 12, line 15 to page 13, line 3 and in originally filed Claims 11 and 19.

Claims 12 – 14 were amended to change the dependency of the claim.

Claims 25 and 26 have been rewritten as independent claims. Support for the amendments to Claims 25 and 26 can at least be found on the specification at page 12, line 15 to page 13, line 3, and in the originally filed Claims 11, 19, and 24.

Support for the new claims can at least be found in the originally filed claims.

No new matter has been introduced by these amendments or new claims.

Reconsideration and allowance of the claims are respectfully requested in view of the above amendments and the following remarks.

Specification

The paragraph beginning at line 15 of page 12 and ending at line 3 of page 12 of the specification has been amended to proper antecedent basis for the term “metal oxide” used in the claims. Support for this amendment can at least be found in originally filed Claim 12.

Claim Rejections Under 35 U.S.C. §§ 102(b) and 102(e)

Claims 21-22, and 24 stand rejected under 35 U.S.C. § 102(b), as allegedly anticipated by GB 1,252,463 to Hayashi et al. Claims 21-22, and 24 stand rejected under 35 U.S.C. § 102(b), as allegedly anticipated by EO 0 606 051 to Shimamune et al. Claims 1, 4-14, 16-26, 27, and 30-32 stand rejected under 35 U.S.C. § 102(b), as allegedly anticipated by U.S. Patent No. 6,156,449 to Zuber et al. Applicants respectfully traverse these rejections.

Claim 1 is directed to an electrode for use in an electrochemical cell system, comprising, based on the total weight of the electrode: about 5 to about 95 wt. % of a support that is non-oxidizable at anodic potentials of greater than about 1.5 to less than about 4 volts, wherein the

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support material is selected from the group consisting of carbides, nitrides, and mixtures comprising at least one the foregoing support materials; about 5 to about 95 wt. % of a catalyst integrated with the support; and up to about 50 wt. % of a proton conductive material integrated with the catalyst.

Claim 21 is directed to a method of manufacturing an electrode for an electrochemical cell, comprising: mixing a catalyst material and a support material that is non-oxidizable at anodic potentials of greater than about 1.5 to less than about 4 volts to form the electrode, wherein the support material is selected from the group consisting of metal oxides, carbides, nitrides, niobium, zirconium, tantalum, cobalt, cobalt superalloys, hafnium, tungsten, tungsten alloys, and mixtures comprising at least one the foregoing support materials; and forming the mixture into an electrode

Claim 24 is directed to a method of manufacturing an electrode for an electrochemical cell, comprising coating or infiltrating preformed support material with a catalyst material, wherein the support material is non-oxidizable at anodic potentials of greater than about 1.5 to less than about 4 volts and wherein the support material is selected from the group consisting of carbides, nitrides, niobium, zirconium, tantalum, cobalt, cobalt superalloys, hafnium, tungsten, tungsten alloys, and mixtures comprising at least one the foregoing support materials.

Hayashi et al. teach making an air electrode by mixing an active carbon, silver and water repellent (page 3, lines 24-40).

Shimamune et al. teach "a gas electrode containing a catalyst containing gold particles dispersed on a conductive oxide carrier such as titanium oxide, and in addition a gas electrode comprising a catalyst comprising electrically-conductive carbon, titanium oxide and gold particles, wherein the gold particles are dispersed on the titanium oxide and both the gold particles and titanium oxide are supported on the electrically-conductive carbon." (Abstract).

Tatchev et al. teach a gold catalyst "for reforming an electrochemical oxidation of hydrocarbon fuels, methanol and methane, for application in the fuel cell industry." (Abstract). "The active component of the catalyst is a complex which consists of gold and reducible oxide from the transition metals group." (Abstract). The support of the catalyst consists of oxides of ceria, zirconia and titanium. (Abstract).

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Zuber et al. teach a "catalyst layer on a substrate material which contains a proton-conducting polymer (ionomers), electrically conductive carbon particles and fine particles of at least one precious metal." (Abstract). They further teach any "carbon materials with high electrical conductivity and high surface area known in the area of fuel cells may be used as a material for the conductive carbon particles. Carbon blacks, graphite or activated carbons are preferably used." (Col. 6, lines 20-24).

To anticipate a claim, a reference must disclose each and every element of the claim. *Lewmar Marine v. Varient Inc.*, 3 U.S.P.Q.2d 1766 (Fed. Cir. 1987).

Hayashi et al., Shimamune et al., and Zuber et al., teach the use of carbon as the support. As is taught in the present application, "the carbon conventionally employed as the diluent [or support] is readily oxidizable in the electrochemical cell environment because of the high anodic potentials applied, which are generally greater than about 1.5 volts." (Page 4, lines 7 - 9). The present claims comprise about 5 wt% to about 95 wt% of a support that is non-oxidizable at anodic potentials of greater than about 1.5 to less than about 4 volts. Since Hayashi et al., Shimamune et al., and Zuber et al., at least fail to teach such a non-oxidizable support, these references fail to anticipate the present claims. It is also noted that these references fail to teach additional aspects of the claims such as the claimed amounts of the various components, particular non-oxidizable supports claimed, and the like. Since these references fail to anticipate the present claims, reconsideration and withdrawal of these rejections are respectfully requested.

Claim 24 stands rejected under 35 U.S.C. § 102(b), as allegedly anticipated by WO 99/16546 to Tatchev et al. Claim 24 has been cancelled, thereby rendering this rejection moot.

Claims 1-32 stand rejected under 35 U.S.C. § 102(e), as allegedly anticipated by U.S. Patent No. 6,183,898 to Koschany et al. Applicants respectfully traverse this rejection.

Claim 27 is directed to a membrane electrode assembly, comprising: a first electrode comprising, based on the total weight of the electrode, about 5 to about 95 wt. % of a support that is non-oxidizable at anodic potentials of greater than about 1.5 to less than about 4 volts, about 5 to about 95 wt. % of a catalyst integrated with the support, wherein the support material is selected from the group consisting of metal oxides, carbides, metal nitrides, niobium, zirconium,

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tantalum, cobalt, cobalt superalloys, hafnium, tungsten, tungsten alloys, and mixtures comprising at least one the foregoing support materials, and about 1 to about 50 wt. % of a proton conductive material integrated with the catalyst; a second electrode; and a proton exchange membrane disposed between the first electrode and the second electrode.

Koschany et al. teach a gas diffusion electrode comprising at least one gas diffusion layer comprising a mechanically stable support material, which is impregnated with at least one conductive material. (Col. 2, lines 24-26). The support material preferably comprises carbon fibers, glass fibers, or fibers comprising organic polymers. (Col. 2, lines 40-42). They further teach the gas diffusion electrode comprising an electrically conductive material, for example carbon black or a metal that is insoluble or only very slightly soluble in water and has a low oxidation sensitivity, and disclose the following examples, Ti, Au, Pt, Pd, Ag or Ni. (Col. 2, lines 60-68). It is noted, however, that they further clearly state that this gas diffusion layer formed from these above materials "does not contain a catalytically active layer...". (Col. 4, lines 21 - 24) A catalytically active layer can be coated on the gas diffusion layer. (Col. 4, lines 26 - 29) The catalytic layer can comprise a catalytically active material, ion-conductive polymer(s), and hydrophobic materials. (Col. 4, lines 36 - 48) If the catalytically active materials are supported, the "preference is given to using carbon as support material." (Col. 4, lines 58 - Col. 6, line 2)

Koschany et al. fails to teach, *inter alia*, amounts set forth in Claims 1 - 20 and Claims 27 - 29, 31 - 37. It is noted that Koschany et al. needs to be read very carefully because they use the same terms to refer to different elements (e.g., "support" is used in relation to the gas diffusion layer and "support" is used in relation to the catalyst of the catalytically active layer). The amounts discussed in relation to the support for the catalytically active layer is in relation to the carbon support, not a support that is non-oxidizable at anodic potentials of greater than about 1.5 to less than about 4 volts, as is claimed in the present application. Koschany et al. fail to teach the electrodes, amounts of component materials, and methods taught and claimed in the present application. Koschany et al. fail to provide any relation between the amounts in the gas diffusion layer and the catalytically active layer. This reference fails to anticipate any of the claims of the present application. Accordingly, Claim 1 is not anticipated by and is allowable

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over Koschany et al. Moreover, as a dependent claim from an allowable independent claim, Claims 2-20, are, by definition also allowable.

With respect to Claims 21 – 23, Koschany et al. fail to teach or even suggest mixing a catalyst material and a support material that is non-oxidizable at anodic potentials of greater than about 1.5 to less than about 4 volts to form the electrode, as is claimed in these claims.

With respect to Claim 25, Koschany et al. at least fail to teach the specified support materials, while, with respect to Claim 26, Koschany et al. fail to teach applying a proton exchange material to the coated support material.

Accordingly, Koschany et al do not anticipate the claims of the present application. Reconsideration and withdrawal of this rejection are respectfully requested.

Claim Rejections Under 35 U.S.C. § 103(a)

Claims 33-35 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Pub. 2002/0098393 to Dine et al. in view of U.S. Patent No. 6,183,898 to Koschany et al. Claims 33-35 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Pub. 2002/0098393 to Dine et al. in view of U.S. Patent No. 6,156,449 to Zuber et al. Applicants respectfully traverse these rejections.

It is first noted that Dine et al. is not a valid reference over the present claims as it was filed after the filing of the date of the Provisional Application to which this patent application claims priority.

It is further noted, that, even as a reference, Dine et al., as is admitted by the Examiner, fail to remedy the deficiencies of the Koschany et al., and Zuber et al., since they do teach about 5 to about 95 wt. % of a support that is non-oxidizable at anodic potentials of greater than about 1.5 to less than about 4 volts, about 5 to about 95 wt. % of a catalyst, and up to about 50 wt. % of a proton conductive material. As such, Dine et al., Koschany et al., and Zuber et al., alone and in combination, fail to render Claims 33 – 35 obvious. Reconsideration and withdrawal of these rejections are respectfully requested.


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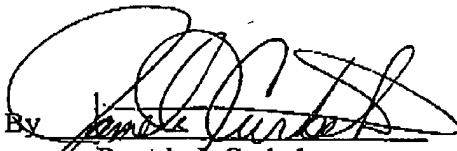
It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and withdrawal of the rejections and allowance of the case are requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

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